UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,803	10/30/2003	Mohamed Shaker Sarwary	Q77571	6876

23373 7590 10/26/2005

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
LIN, SUN J	

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 10/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

N/A

Office Action Summary	Application No.	Applicant(s)	
	10/695,803	SARWARY ET AL.	
	Examiner	Art Unit	
	Sun J. Lin	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,12-21,27-36 and 42-45* is/are rejected.

7)☒ Claim(s) *7-11,22-26 and 37-41* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10/30/2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02/04/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to application 10/695,803 filed on 10/30/2003. Claims 1 – 45 remain pending in the application.

Specification Objection

2. The specification is objected to because of following informalities:

Page 13, Paragraph [0022], line 11, change "AND" to —**NAND**—.

Appropriate correction is required.

Drawing Objection

3. Drawing listed below is objected to because of following informalities:

Fig. 1, insert reference numeral —**100**— to clearly indicate *logic circuit 100* as described in Paragraph [0004], line 1 – 2.

Appropriate correction is required.

Claim Objections

4. Claims listed below are objected to because of the following informalities:

Claim 1, line 4, before "crossings" insert —**clock-domain**—.
Claim 1, line 6, before "crossing" insert —**determined clock-domain**—.
Claim 1, line 8, change "the crossing" to —**the determined clock-domain crossing**—.
Claim 1, line 8, after "unstable" insert —**clock-domain**—.
Claim 2, line 2, after "unstable" insert —**clock-domain**—.
Claim 3, line 1, before "crossing" insert —**determined clock-domain**—.
Claim 4, line 1, change "the register" to —**each of the registers**—.
Claim 6, line 1, after "wherein" insert —**each of the determined clock-domain crossings lacking**—.
Claim 10, line 3 – 4, change "the first and second clock domains" to —**the first clock domain and the second clock domain**—.
Claim 10, line 4, before "crossing" insert —**determined clock-domain**—.

Claim 12, line 1, after "unstable" insert —**clock-domain**—.
Claim 12, line 2, before "crossing" insert —**determined clock-domain**—.
Claim 13, line 4, before "crossing" insert —**determined clock-domain**—.
Claim 14, line 3, before "crossings" insert —**clock-domain**—.
Claim 14, line 3, before "candidate" insert —**identified**—.
Claim 14, line 4, before "crossings" insert —**clock-domain**—.
Claim 14, line 5, change " the candidate crossing" to —**each of the identified candidate unstable clock-domain crossings**—.
Claim 14, line 6, change "a candidate" to —**an identified candidate**—.
Claim 14, line 6, before "crossing" insert —**clock-domain**—.
Claim 14, line 7, before "candidate" insert —**identified**—.
Claim 14, line 7, after "unstable" insert —**clock-domain**—.
Claim 14, line 8, after "unstable" insert —**clock-domain**—.
Claim 16, line 7, before "crossings" insert —**clock-domain**—.
Claim 16, line 9, before "crossing" insert —**determined clock-domain**—.
Claim 16, line 11, change "the crossing" to —**the determined clock-domain crossing**—.
Claim 16, line 11, after "unstable" insert —**clock-domain**—.
Claim 17, line 2, after "unstable" insert —**clock-domain**—.
Claim 18, line 2, before "crossing" insert —**determined clock-domain**—.
Claim 19, line 1 – 2, change "the register" to —**each of the registers**—.
Claim21, line 1, after "wherein" insert —**each of the determined clock-domain crossings lacking**—.
Claim 25, line 3 – 4, change "the first and second clock domains" to —**the first clock domain and the second clock domain**—.
Claim 25, line 4, before "crossing" insert —**determined clock-domain**—.
Claim 27, line 2, after "unstable" insert —**clock-domain**—.
Claim 27, line 3, before "crossing" insert —**determined clock-domain**—.
Claim 28, line 4, before "crossing" insert —**determined clock-domain**—.
Claim 29, line 3, before "crossings" insert —**clock-domain**—.
Claim 29, line 4, before "candidate" insert —**identified**—.
Claim 29, line 4, after "unstable" insert —**clock-domain**—.
Claim 29, line 5 – 6, change " the candidate crossing" to —**each of the identified candidate unstable clock-domain crossings**—.

Claim 29, line 6, change "a candidate" to —**an identified candidate**—.
Claim 29, line 6, before "crossing" insert —**clock-domain**—.
Claim 29, line 7, before "candidate" insert —**identified**—.
Claim 29, line 7, after "unstable" insert —**clock-domain**—.
Claim 29, line 8, after "unstable" insert —**clock-domain**—.
Claim 31, line 8, before "crossings" insert —**clock-domain**—.
Claim 31, line 10, before "crossing" insert —**determined clock-domain**—.
Claim 31, line 13, change "the crossing" to —**the determined clock-domain crossing**—.
Claim 31, line 14, after "unstable" insert —**clock-domain**—.
Claim 32, line 2, after "unstable" insert —**clock-domain**—.
Claim 33, line 1, before "crossing" insert —**determined clock-domain**—.
Claim 34, line 1, change "the register" to —**each of the registers**—.
Claim 36, line 1, after "wherein" insert —**each of the determined clock-domain crossings lacking**—.
Claim 40, line 3 – 4, change "the first and second clock domains" to —**the first clock domain and the second clock domain**—.
Claim 40, line 4, before "crossing" insert —**determined clock-domain**—.
Claim 42, line 1, after "unstable" insert —**clock-domain**—.
Claim 42, line 3, before "crossing" insert —**determined clock-domain**—.
Claim 43, line 4, before "crossing" insert —**determined clock-domain**—.
Claim 44, line 3, before "crossings" insert —**clock-domain**—.
Claim 44, line 3, change "the candidate" to —**the identified candidate**—.
Claim 44, line 4, after "unstable" insert —**clock-domain**—.
Claim 44, line 5, change " the candidate crossing" to —**each of the identified candidate unstable clock-domain crossings**—.
Claim 44, line 6, change "a candidate" to —**an identified candidate**—.
Claim 44, line 6, before "crossing" insert —**clock-domain**—.
Claim 44, line 7, before "candidate" insert —**identified**—.
Claim 44, line 7, after "unstable" insert —**clock-domain**—.
Claim 44, line 8, after "unstable" insert —**clock-domain**—.

Appropriate corrections are required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1 – 6, 12 – 21, 27 – 36 and 42 – 45 are rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent Application Publication No. 2002/0120896 A1 to *Wang et al.*

7. As to Claim 1, *Wang et al.* show and teach the following subject matter:

- A method and system for detecting *crossing clock-domain faults* (i.e., *unstable clock-domain crossing*) in a *logic design* 133 of an integrated circuit – [title; abstract; Paragraph 0002; Fig. 1; Fig. 2];
- Determining *time-domain crossings* CCD 106 – 108 in the *logic design* 133 – [Paragraph 0002; Fig. 1; Fig. 2]; Notice that each of the determined time-domain crossing is lacking of a structural synchronization cell;
- Making a *fault detection* (i.e., *stability determination*) for each *time- domain crossing* (e.g., CCD1 106) between two clock domains (CD1 102, CD2 103) – [Fig. 1; Paragraph 0013];
- *Error Indicator* 226 provides an indication to indicate a *crossing clock-domain fault* (*unstable clock-domain crossing*) in the *fault detection* (*stability determination*) of the clock-domain crossing under study – [Fig.2].

For reference purposes, the explanations given above in response to Claim 1 are called **[Response A]** hereinafter.

8. As to Claims 16 and 31, reasons are included in **[Response A]** given above.

9. As to Claims 2, 17 and 32, the *Error Indicator* is provided to highlight the *unstable clock-domain crossing* (*cross-domain crossing fault*).

10. As to Claims 3 – 5, 18 – 20 and 33 – 35, in addition to reasons included in **[Response A]** given above, *Wang et al.* show and teach the following subject matter:

- Each of clock domains CD1 and CD2 includes scan registers – [Fig. 1]; Notice that (1) each of register is clocked by a respective clock signal (2) the respective clock signals can be different frequencies – [Paragraph 0059]
- Clock domains CD1 and CD2 are connected to crossing clock domain logic block CCD1 – [Fig. 1; Paragraph 0058]; Notice that (1) a logic block can contain a combinational path (1) a combinational path comprises at least of one of logic gate (e.g., AND, OR, NAND, NOT or XOR) .
- Each of the scan registers can be a multiplexed D flip-flop – [Paragraph 0027].

11. As to Claims 6, 21 and 36, *Wang et al.* show and teach the subject matter (e.g., scan cell/register, multiplexed D flip-flop) in [Fig. 1; Paragraph 0027].

12. As to Claims 12, 13, 27, 28, 42 and 43, *Wang et al.* show and teach the subject matter in [Fig. 1; Figs. 9 – 23].

13. As to Claims 14, 29 and 44, *Wang et al.* teach a method/apparatus for detecting and *locating* crossing clock-domain faults in an integrated circuit – [abstract; Fig. 1; Fig. 2]. Notice that (2) the apparatus is a clock synchronization analysis tool, it is used to identify all candidate unstable time-domain crossings (2) a "true" unstable time-domain crossing is *located* (3) a "false" unstable time-domain crossing is eliminated.

14. As to Claims 15, 30 and 45, *Wang et al.* show and teach the subject matter regarding CAD system – [abstract; Paragraph 0014].

Allowable Subject Matter

15. Claims 7 – 11, 22 – 26 and 37 – 41 are objected to as being dependent upon a rejected base claim, but they would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Those claims are allowed is because the prior art does not teach or suggest the following subject matter:

- A *method/computer program product/computer system* for detecting unstable clock-domain crossings in a design of an integrated circuit comprising *making a stability determination for each of clock-domain crossings lacking a structural synchronization cell determined in the design, wherein the stability determination is made based on satisfaction of a stability function* in combination with other limitations as recited in **Claim 7**, **Claim 22** and **Claim 37**, respectively;
- A *method/computer program product/computer system* for detecting unstable clock-domain crossings in a design of an integrated circuit comprising *making a stability determination for each of clock-domain crossings lacking a structural synchronization cell determined in the design, wherein the stability determination is performed using at least one of model checking and bounded model checking (MBC)* in combination with other limitations as recited in **Claim 11**, **Claim 26** and **Claim 41**, respectively.

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sun J Lin whose telephone number is (571) 272 - 1899. The examiner can normally be reached on Monday-Friday 9:30AM - 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S Smith can be reached on (571) 272 - 1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sun James Lin
Patent Examiner
Art Unit 2825
October 24, 2005